LOCKHEED MARTIN

We never forget who we're working for®

Insights

Fourth Quarter 2006
Volume 3 • Number 4
www.lockheedmartin.com

Strategies and Advancements in Net-Centric Operations

A Conversation

with Dr. Delores M. Etter

Q: Would you explain what open architecture (OA) means to you?

Dr. Etter: Everybody has their own definition of open architecture. We tend to think primarily of software, but it certainly fits hardware definitions, too. I think of it as a design, using commercial standards that will allow us flexibility to do several different things. For example, decoupling both hardware and software components to reuse them.

OA design will allow us to have different teams designing different pieces of a system, and to the Navy, that's extremely important. It says we should be able to do things not only faster, because of the parallelism that can be done, but also more affordably because there is now more competition for the components.

Q: The U.S. Navy's intent, then, is to tap into the niche technology innovation offered by the smaller contracting community?

Dr. Etter: That's right. When you're looking at one company to design an extremely large system, there aren't a lot of contractors who have the experience to do that. But, if you're using an open, modular design where different functionality can be done by different contractors, then there is a much wider range of companies that can do the work. It opens up the opportunity to a lot more players, not only for smaller companies, but for academic groups to also become involved.

Both of those groups have a lot, potentially, to add to the competition mix. I see one effect of OA as bringing in a lot more players from both of those groups.

Q: How do you grow the technology expertise among these new players?

Dr. Etter: One of the things I'm seeing that is a really great idea is industry's development of "collaboration centers." It's something the Navy has done also; we have one at Dahlgren, the Warfare Center there. Those centers are a great way to provide opportunities for small companies or academic groups to use a system that

BIOGRAPHY

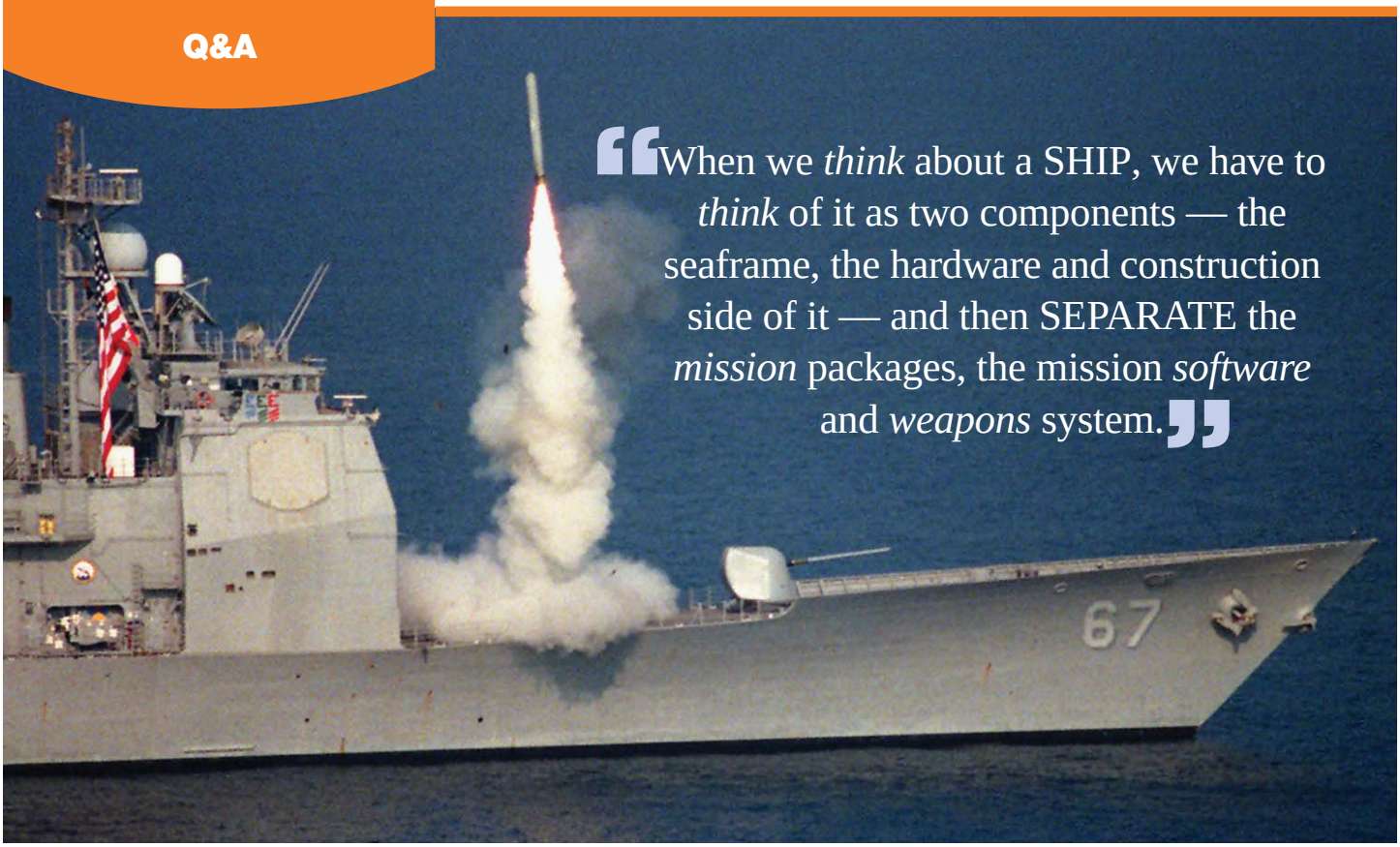
Dr. Delores M. Etter
Assistant Secretary of the Navy For Research, Development and Acquisition, U.S. Navy

Dr. Delores M. Etter is Assistant Secretary of the U.S. Navy for Research, Development and Acquisition. As the Navy's senior acquisition executive, Dr. Etter is responsible for research, development, and acquisition within the Department of the Navy.

Prior to her current position, she was a member of the Electrical Engineering faculty at the United States Naval Academy. She was also the first recipient of the Office of Naval Research Distinguished Chair in Science and Technology. Her academic interests were in digital signal processing and communications. Her research interests included biometric signal processing, with an emphasis on identification using iris recognition. She has also written several textbooks on computer languages and software engineering.

Dr. Etter has served as the Deputy Under Secretary of Defense for Science and Technology. In that position, she was responsible for Defense Science and Technology strategic planning, budget allocation, and program execution and evaluation for the DoD Science and Technology Program. She was the principal U.S. representative to the NATO Research and Technology Board. Dr. Etter has also been responsible for the Defense Modeling and Simulation Organization, the High Performance Computing Modernization Office, and for technical oversight of the Software Engineering Institute. Dr. Etter was also the senior civilian in charge of the DoD high-energy laser research program.

She has received the Department of the Navy Distinguished Public Service Award, the Secretary of Defense Outstanding Public Service Medal, and the Department of Defense Distinguished Public Service Medal.



> "When we *think* about a SHIP, we have to *think* of it as two components — the seaframe, the hardware and construction side of it — and then SEPARATE the *mission* packages, the mission *software* and *weapons* system."

already has the software or framework loaded — it's easy for them to, essentially, plug in their capabilities and test it on the larger software.

A particular need from the Navy side is to do this in classified arenas offered through industry's facilities. It's often too much of a cost burden for small contractors or universities to develop a system and do this kind of testing with classified materials.

Change Business Models to Achieve OA

Q: What is your vision for implementing open architecture throughout the Navy, and how will you achieve that?

Dr. Etter: There are really two actions we must take. One is we have to change our business models to support this initiative. When we think about a ship, we have to think of it as two components — the seaframe, the hardware and construction side of it — and then separate the mission packages, the mission software and weapons system. These could be separated internally into two different programs within the acquisition program.

Second, we need to consider how to integrate OA into existing legacy systems. If you had the luxury of doing everything from scratch, you could make everything pretty much open architecture from the beginning. As we now examine new contracts and extensions of contracts, we look very closely at how we can increase the amount of openness we have in a program.

Q: What is the driver for this — the need to share information and data, or develop new capabilities?

Dr. Etter: Both, but the overall driver is affordability. We're trying to get to a 313-ship Navy and we face real challenges to do that. I see from my acquisition role two improvements that stand out as being really important to achieve that. One is some of the exciting changes occurring within the shipyards as they evaluate production engineering changes learned from observing commercial shipyards in Asia and Europe, combined with a lot of Lean, Six Sigma thinking.

A lot of those developments will help us, but that's roughly half the cost of a new ship. The other half of the cost is the

Legacy Systems Benefit From OA

Q: What have been some of the open architecture successes in Navy programs? What should industry — and the Navy — learn from these?

Dr. Etter: As you look at successes, there are a lot of takeaways from those that are best practices or good ideas, but it's very seldom you find that a new program can be exactly the same as an old model. It's important we try not to force things into models that, maybe, are not the best fit.

Probably the most successful model has been the submarine community — the ARCI (Acoustic Rapid COTS Insertion program) model. Again, affordability drove this success. How were we going to get capabilities across a number of platforms in a way that we could actually afford not only the development of the system, but the execution and the life cycle cost? It used a lot of COTS capabilities, and today we're seeing it's a much broader set of functionality. It's on some surface ships and we're in the process of developing ways to take those same capabilities, and in many cases with exactly the same software, and put it on our aircraft — the P-3s, for example, which are very important platforms in anti-submarine warfare. That's a great example of how we can buy it once, but you have to do so smartly and plan it carefully with industry. We now have this capability of taking that common software and putting it on many platforms. That's a good example, in terms of long-term success and also affordability.

A lot of our C4I systems have been done with open architectures, particularly our common operational picture software, and because of this we were able to add an automatic identification system used on commercial ships to our ship systems. That gave us an amazing increase in the ability to see merchant ship tracks — twice as many as before — within our military systems. We fielded this system within two months; in less than two years we will have it installed on all surface ships. That's an example of something that could not be done if we didn't have commercial capability already developed, and if we did not have an open architecture design that allowed us to incorporate the system quickly.

When our H-53 Heavy Lift Helicopter Program Office needed a lightweight, very survivable monitoring system that would let them do essential health analysis on a helicopter's critical components, they required the prime contractor to publish key interface specifications. We found a lot of vendors were very interested and that their modules could be interchanged without affecting performance. Now, as a result, we have an Integrated Mechanical Diagnostics System that detects component failures and is widely used across the Navy helicopter community.

These show that you don't have to start with a brand new system to receive benefits from OA.

mission system software and the weapons system — and that gets us clearly into open architecture. This is not business as usual. We need totally new business models for doing this, but must also embrace the technical changes that emerge, the open architecture. It's a combination of those things that will give us the affordability for the 313-ship Navy.

Q: What are the net-centric impacts of achieving the open architecture vision within the Navy?

Dr. Etter: As we look at the net-centric requirements for our future Navy and our future Department of Defense, whether it's working within our services together, or with our allies, the implications are real important. I would point to FORCEnet itself, which is an operational construct that allows us to integrate warriors, sensors, command and control, platforms and weapons and do all of this in a networked, distributed manner. The same business and technical principles from OA will support that. I see these working together very much.

New Roles for Industry; Dialogue Needed

Q: What do you see as the proper role of industry — and of the industry-government partnership — in helping achieve the vision you have for OA?

Dr. Etter: We can't do this without industry, so getting their buy-in and leadership is important. Industry has, in the past, proven to be innovative and creative, and we're counting on industry to lead the way with OA. It will require some changes, however, and I think that's something that industry recognizes — to be successful, you have to take advantage of new ideas that come along.

Some of the big changes I see from industry are mainly with the relationships they have with other contractors and with our warfare centers. Industry will have to evolve from OEM (Original Equipment Manufacturer) roles to systems integrator roles using innovative and non-traditional DoD-type companies to provide the products. They should take advantage of new players that can help them design, test and implement systems much quicker and much more economically.

I also sense from our side that in our warfare centers and in our acquisition programs we need people who have a lot more of the systems engineering background and who can work with industry as we design programs with OA designs and think about life-cycle development.

Q: What investments should industry make to become a better partner with the Navy?

Dr. Etter: Industry is really getting a head start by setting up those collaboration centers and by starting to develop arrangements with small companies and academic organizations. This is a great way for industry to reach out and bring in these other players to participate with them either as subcontractors to develop the capabilities that all of us can draw on.

As we look at contracts for new systems and legacy systems, we need to provide avenues to have a lot of dialogue with industry on the ways we can creatively think about working together. One of the things we're planning is a "CEO conference" next spring, and we will have a number of topics we want to discuss with industry — one of them being OA. Certainly, within that discussion is 'if we move down the OA path together, what should industry be doing, what should we be doing?' We need opportunities for these dialogues to discuss these points from the technical side, as well as think about the contract implications and the new types of interactions we need to have.

Open Architecture Impact on LCS, Aegis

Q: Do you see open architecture as being more important in one area of the Navy than another, or will this approach be across the board?

Dr. Etter: If you look at the budget and the future plans for the Navy, shipbuilding and surface ships are probably where my focus will be. The DDG-1000 (destroyer) will be a very key part of our future fleet as a warship with very significant capabilities.

We're just now starting to work with the LCS (Littoral Combat Ship). The first LCS, a Lockheed Martin design, was just christened and will be commissioned next year. The second one is a General Dynamics design and that one will be christened next year. Four of these first LCS' have open architecture designs — we will look at those carefully and make sure we are comfortable with where we are on those, and think about any potential changes we might want to make with regard to OA. Clearly, there are some areas we have done right in these, but there may be some other areas where we would want to look for potential modifications. Getting LCS right is real important. Out of the 313-ship Navy, 55 of those are going to be LCS and we clearly want open architecture as a key piece of it.

As we look at upgrades, we have a lot of different ship configurations of Aegis systems — cruisers, destroyers. The Aegis weapons system has both a long remaining service life and a very high likelihood of change. It is a complex system with logical opportunities to leverage modularity, and it will need to adapt to changing threats and Fleet mission needs. An imperative exists to implement OA within the Aegis system.

Lockheed Martin
Center for Innovation

Lockheed Martin Center for Innovation
8000 Harbour View Boulevard
Suffolk, Virginia 23435 USA
www.lockheedmartin.com/innovation

Lockheed Martin is an Equal Opportunity Employer.